An attempt to incorporate separate chemical and thermal freeze outs in hydrodynamics

N.Arbex [a] F.Grassi [a] Y.Hama [a] O.Socolowski Jr. [a]

[a] *Instituto de Fisica-Universidade de Sao Paulo, Brazil*

Presented by: F.Grassi

Abstract

To describe relativistic heavy-ion data at AGS and SPS, a coherent picture has been proposed, where particles first undergo a chemical freeze out and then a thermal freeze out. Normally different models are used to analyze various types of data. So first we show using the *same* hydrodynamical model, HYLANDER-PLUS that it is possible to reproduce both NA49 strange particle abundances assuming a chemical freeze out at $T_{chem} \sim 180$ MeV and their transverse momentum spectra assuming a thermal freeze out at $T_{therm.} \sim 140$ MeV. At this stage no modification is included in the hydrodynamical equations to include the effect of the chemical freeze out on the fluid behavior. Second, we study this hypothesis within a simpler (Bjorken) hydrodynamical model. **We show that the fluid can reach thermal freeze out substantially faster when separate chemical and thermal freeze outs are incorporated in the hydrodynamical equations** and frozen out volumes, predicted abundances and interferometry radii are smaller.

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